



Three Mile Island Nuclear Generating  
Station  
Medical Services Drill  
After Action Report/Improvement Plan  
Drill Date – March 28, 2018  
Radiological Emergency Preparedness (REP) Program



FEMA

*Published April 24, 2018*

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# Three Mile Island (TMI) Nuclear Generating Station Medical Services Drill After Action Report/Improvement Plan

*Published Date: April 24, 2018*

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## EXECUTIVE SUMMARY

On March 28, 2018 a Medical Services (MS-1) Drill was conducted for the 10-mile Plume Exposure Pathway, Emergency Planning Zone (EPZ) around the Three Mile Island (TMI) Nuclear Generating Station by the Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA) Region III. The most recent prior MS-1 Drill for this site was conducted on April 4, 2013.

The purpose of the (TMI) MS-1 Drill was to assess the State and local offsite response organizations preparedness in responding to a radiological medical emergency. The Drill was held in accordance with FEMA's policies and guidance concerning the evaluation of State and local Radiological Emergency Response Plans (RERP) and procedures.

FEMA wishes to acknowledge the efforts of the many individuals in the Commonwealth of Pennsylvania, Lebanon County Emergency Management Agency, Wellspan Good Samaritan Hospital and the First Aid and Safety Patrol Emergency Medical Services, who were evaluated during this Drill.

Protecting the public health and safety is the full-time job of some of the Drill participants and an additional assigned responsibility for others. Still others have willingly sought this responsibility as volunteers providing vital emergency services twenty-four (24) hours a day to the communities in which they live. Cooperation and teamwork of all the participants was observed during this Drill.

This report contains the final evaluation of the MS-1 Drill. The Commonwealth of Pennsylvania and local organizations demonstrated knowledge of their emergency response plans and procedures and adequately implemented them. There were no Level 1 or Level 2 Findings or Plan Issues as a result of this Drill.

## SECTION 1: EXERCISE OVERVIEW

### 1.1 Drill Details

**Drill Name**

Wellspan Good Samaritan Hospital 2018 Medical Services Drill.

**Type of Drill**

Medical Services

**Drill Date**

March 28, 2018

**Program**

Department of Homeland Security/FEMA Radiological Emergency Preparedness Program

**Scenario Type**

Radioactive Contaminated/Injured Person

### 1.2 Planning Team Leadership

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### **1.3 Participating Organizations**

Agencies and organizations of the following jurisdictions participated in the TMI 2018 Medical Services Drill:

#### **State Jurisdictions**

- Pennsylvania Emergency Management Agency

#### **Risk Jurisdictions**

- Lebanon County Emergency Management Agency (LCEMA)

#### **Private Sector Organizations**

- Wellspan Good Samaritan Hospital
- First Aid and Safety Patrol Emergency Medical Services (FASPEMS)

## SECTION 2: DESIGN SUMMARY

### 2.1 Purpose and Design

On December 7, 1979, the President directed the Federal Emergency Management Agency (FEMA) to assume the lead responsibility for all off-site radiological planning and response. FEMA's activities were conducted pursuant to 44 Code of Federal Regulations (CFR) Parts 350, 351 and 352. These regulations are a key element in the Radiological Emergency Preparedness (REP) Program that was established following the TMI accident in March 1979.

44 CFR 350 establishes the policies and procedures for FEMA's initial and continued approval of State and local governments' radiological emergency planning and preparedness for commercial nuclear power plants. This approval is contingent, in part, on State and local government participation in joint exercises with licensees. FEMA's responsibilities in radiological emergency planning for fixed nuclear facilities include the following:

- A. Taking the lead in offsite emergency planning and in the review and evaluation of radiological emergency response plans and procedures developed by State and local governments;
- B. Determining whether such plans and procedures can be implemented on the basis of observation and evaluation of exercises of the plans and procedures conducted by State and local governments;
- C. Responding to requests by the U.S. Nuclear Regulatory Commission (NRC) pursuant to the Memorandum of Understanding between the NRC and FEMA dated December 7, 2015 (Federal Register, Vol. 81, No. 57, March 24, 2016) and;
- D. Coordinating the activities of the following Federal agencies with responsibilities in the radiological emergency planning process:
  - U.S. Department of Commerce
  - U.S. Nuclear Regulatory Commission
  - U.S. Environmental Protection Agency
  - U.S. Department of Energy
  - U.S. Department of Health and Human Services
  - U.S. Department of Transportation
  - U.S. Department of Agriculture
  - U.S. Department of the Interior
  - U.S. Food and Drug Administration

Representatives of these agencies serve on the Region III Regional Assistance Committee (RAC), which is chaired by FEMA. A Radiological Emergency Preparedness MS-1 Drill was conducted on March 28, 2018, to assess the capabilities of State and local emergency preparedness organizations in implementing their radiological emergency response plans and procedures to protect the public health and safety during a radiological emergency involving TMI.



The purpose of this After Action Report (AAR) is to present the Drill results, and findings on the performance of the Off-site Response Organizations (OROs) during a simulated radiological emergency involving a contaminated injured individual.

The Drill was designed to demonstrate and evaluate the responder's knowledge of patient and responder personal protective measures, equipment preparation and employment, and decontamination procedures. All activities were demonstrated in accordance with the participants' plans and procedures as they would be performed in an actual emergency, except as agreed to in the Exercise Plan and Extent-of-Play (EOP) Agreement.

The findings presented in this report are based on the evaluations of the Federal evaluator team, with final determinations made by the FEMA Region III Regional Assistance Committee (RAC) Chairperson and approved by FEMA Headquarters. These reports are provided to the Nuclear Regulatory Commission (NRC) and participating States. State and local governments utilize the findings contained in these reports for the purposes of planning, training, and improving emergency response capabilities.

- Section 1 of this report, entitled Overview, presents the Exercise Planning Team and the Participating Organizations.
- Section 2 of this report, entitled Design Summary, includes the Purpose and Design, Objectives, Capabilities and Activities, and the Scenario Summary.
- Section 3 of this report entitled Analysis of Capabilities contains detailed Evaluation and Results; a Summary Results of Evaluation; and Criteria Evaluation Summary. Information on the demonstration for each jurisdiction or functional entity evaluated is presented in a jurisdiction-based, issue-only format.
- Section 4 of this report entitled Conclusion, is a description of FEMA's overall assessment of the capabilities of the participating organizations.

The criteria utilized in the FEMA evaluation process are contained in the following:

- NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980;
- Radiological Emergency Preparedness Program Manual, January 2016

## **2.2 Objectives, Capabilities and Activities**

The TMI MS-1 Drill evaluated by FEMA, was designed to demonstrate that the ORO can transport, transfer, monitor, decontaminate and treat a contaminated/injured person while minimizing any cross contamination during a radiological emergency.

The demonstration included the ability to:

- A. Respond to a radiation medical emergency following Lebanon County Emergency Management Agency, Wellspan Good Samaritan Hospital and First Aid and Safety Patrol Emergency Medical Services procedures.
- B. Monitor for radiation contamination and uptake, and to validate persons providing these services are adequately prepared to handle contaminated individuals.
- C. Conduct timely and accurate communications between the hospital and offsite response agencies.
- D. Exhibit correct priorities and appropriate techniques in Emergency Medical Services (EMS); transportation of patients; and pre-hospital and hospital emergency care of patients contaminated with radiation.
- E. Demonstrate inter-agency cooperation between the First Aid and Safety Patrol Emergency Medical Services and Wellspan Good Samaritan Hospital.

## 2.3 Scenario Summary

The scenario began at Site Area Emergency (SAE) with first call to the hospital from Lebanon County Emergency Management Agency stating that a Site Area Emergency (SAE) was declared at 0900 at TMI. At 0915, a follow on call was received at the hospital from Lebanon County Emergency Management Agency of an escalation to General Emergency (GE). At 0920, the Wellspan Good Samaritan Hospital nurses station received a call from First Aid and Safety Patrol Emergency Medical Services (EMS) stating that they are treating an evacuee at a local gas station for lower abdominal and back pain, along with pharyngitis symptoms that may have been caused by an earlier choking incident. EMS stated they are treating the patient as potentially contaminated due to the incident at TMI and preparing the patient for transport. The patient was C-collared, cocooned, and placed on a back board to stabilize potential neck and cervical spine injuries. The First Aid and Safety Patrol EMS crew prioritized injuries over contamination concerns, and initiated contamination control protocols while deferring radiological surveying to the medical staff at Wellspan Good Samaritan Hospital.

## SECTION 3: ANALYSIS OF CAPABILITIES

### 3.1 Evaluation and Results

Contained in this section are the results and findings of the evaluations of all jurisdictions and locations that participated in the March 28, 2018 TMI MS-1 Drill. The Drill was conducted to demonstrate the ability of the OROs to respond to a potentially contaminated injured person associated with TMI.

Each jurisdiction and functional entity was evaluated on the basis of its demonstration of the appropriate Demonstration Criteria contained in the REP Program Manual. Detailed information on the Demonstration Criteria and the Extent-of-Play Agreement are found in Appendix C.

The Drill was conducted and evaluated in accordance with the Radiological Emergency Preparedness Program Manual (January 2016) and NUREG-0654/FEMA-REP-1, Rev. 1. The Demonstration Criteria included:

- 1.e.1- Equipment, maps, displays, monitoring instruments, dosimetry, Potassium Iodide (KI) and other supplies are sufficient to support emergency operations.
- 3.a.1- The OROs issue appropriate dosimetry, KI, and procedures, and manage radiological exposure to emergency workers in accordance with the plans/procedures. Emergency workers periodically and at the end of each mission read their dosimeters and record the readings on the appropriate exposure record or chart. OROs maintain appropriate record-keeping of the administration of KI to emergency workers.
- 6.d.1- The facility/ORO has the appropriate space, adequate resources, and trained personnel to provide transport, monitoring, decontamination, and medical services to contaminated injured individuals.

### 3.2 Summary Results of Evaluation

The matrix presented in Table 3.1, on the following pages, presents the status of the Demonstration Criteria from the REP Program Manual that were scheduled for demonstration during this Drill by all participating jurisdictions and functional entities. Drill Demonstration Criteria are listed by number and the demonstration status of the criteria is indicated by the use of the following letters:

(L1) Level 1 Finding: An observed or identified inadequacy of organizational performance in an exercise that could cause a determination that offsite emergency preparedness is not adequate to provide reasonable assurance that appropriate protective measures can be taken in event of a radiological emergency to protect the health and safety of the public living in the vicinity of a Nuclear Power Plant (NPP).

(L2) Level 2 Finding: An observed or identified inadequacy of organizational performance in an exercise that is not considered, by itself, to adversely impact public health and safety.

(P) Plan Issue: An observed or identified inadequacy in the off-site response organizations' emergency plan/implementing procedures, rather than that of the ORO's performance.

(N) Not Demonstrated: The term applied to the status of a REP Evaluation Area Criterion indicating that the ORO, for a justifiable reason, did not demonstrate the Evaluation Area Criterion, as required in the Extent-of-Play Agreement or at the two-year or eight-year interval required in the FEMA REP Program Manual.

(M) Met: The status of a REP Evaluation Area Criterion indicating that the participating ORO demonstrated all demonstration criteria for the Evaluation Area Criterion to the level required in the Extent-of-Play Agreement with no findings assessed in the current exercise and no unresolved prior -findings.

Table 3.1 – Summary of Drill Evaluation

Date: 2018-March-28 Site: TMI			WGS	FASPEMS
(M) Met, (1) Level 1 Finding, (2) Level 2 Finding, (P) Planning Issue				
<b>Emergency Operations Management</b>				
Mobilization	1a1			
Facilities	1b1			
Direction and Control	1c1			
Communications	1d1			
Equipment and Supplies to Support Operations	1e1	M	M	
<b>Protective Action Decision Making</b>				
Emergency Worker Exposure Control	2a1			
Accident Assessment and Plans for the Emergency Event	2b1			
PAD decision-making process and coordination for the General Public	2b2			
PADs for disabilities & access/functional needs people	2c1			
Radiological Assessment & Decision making for the Ingestion Pathway	2e1			
Radiological Assessment & Decision making for Relocation/Reentry/Return	2d1			
<b>Protective Action Implementation</b>				
Implementation of Emergency Worker Exposure Control	3a1	M	M	
Implementation of KI PAD for Institutionalized Individuals/Public	3b2			
Implementation of PADs for disabilities & access/functional needs people	3c1			
Implementation of PADS for Schools	3c2			
Implementation of Traffic and Access Control	3d1			
Impediments to Evacuation	3d2			
Implementation of Relocation/Reentry/Return Decisions	3f1			
<b>Field Measurements and Analysis</b>				
RESERVED	4a1			
Field Team Management	4a2			
Plume Phase Field Measurement, Handling, & Analyses	4a3			
Post Plume Phase Field Measurements & Sampling	4b1			
<b>Emergency Notification and Public Information</b>				
Activation of the Prompt Alert & Notification System (ANS)	5a1			
RESERVED	5a2			
Activation of the Back-up ANS	5a3			
Activation of the Exception Area ANS	5a4			
Emergency Information & Instructions to the Public/Media	5b1			
<b>Support Operations/Facilities</b>				
Monitoring, Decontamination, & Registration of Evacuees	6a1			
Monitoring/Decontamination of Emergency Workers and Equipment	6b1			
Temporary Care of Evacuees	6c1			
Transportation/Treatment of Contaminated Injured Individuals	6d1	M	M	

### **3.3 Criteria Evaluation Summaries**

#### **3.3.1 Private Organizations**

In summary, the status of DHS/FEMA criteria for the Private Sector Organizations are as follows:

##### **3.3.1.1 Lebanon County) County, Wellspan Good Samaritan Hospital**

- a. MET: 1.e.1; 3.a.1; 6.d.1
- b. LEVEL 1 FINDINGS: NONE
- c. LEVEL 2 FINDINGS: NONE
- d. PLAN ISSUES: NONE
- e. PRIOR ISSUES – RESOLVED: NONE
- f. PRIOR ISSUES – UNRESOLVED: NONE

##### **3.3.1.2 Lebanon County, First Aid and Safety Patrol Emergency Medical Services**

- a. MET: 1.e.1; 3.a.1; 6.d.1
- b. LEVEL 1 FINDINGS: NONE
- c. LEVEL 2 FINDINGS: NONE
- d. PLAN ISSUES: NONE
- e. PRIOR ISSUES – RESOLVED: NONE
- f. PRIOR ISSUES – UNRESOLVED: NONE

## SECTION 4: CONCLUSION

The Commonwealth of Pennsylvania and private sector organizations, except where noted in this report, demonstrated knowledge of their radiological emergency response plans and procedures and they were successfully implemented during the TMI MS-1 Drill evaluated on March 28, 2018.

Two FEMA evaluators provided analyses of six evaluation criteria. These analyses resulted in a determination of no Findings, no new Plan Issues, and no unresolved Plan Issues.

The First Aid and Safety Patrol Emergency Medical Services (FASPEMS) successfully demonstrated that necessary equipment and supplies were available to support the treatment of an injured/contaminated patient. EMS personnel prioritized life-saving medical practices over contamination concerns, implemented protective measures through the use of Personal Protective Equipment (PPE), regular glove changes, and control of cross contamination. Appropriate patient assessments were demonstrated as well as regular and ongoing communications with Wellspan Good Samaritan Hospital.

The Wellspan Good Samaritan Hospital successfully demonstrated the mobilization of staff, staffing assignments, issue of dosimetry and monitoring equipment, and effective use of Personal Protective Equipment during the exercise. The hospital staff effectively responded to communications from the FASPEMS, initiated the set-up and management of a Radiation Emergency Area, and accepted and successfully treated an injured/contaminated patient while administering life-saving medical attention over contamination concerns. In addition, the medical facility provided security control of the facility including the drop off bay for the patient and overall protective measures for contamination control and prevention of cross contamination.

Based on the results of the Drill and a review of the offsite radiological emergency response plans and procedures submitted, FEMA Region III has determined they are adequate (meet the planning and preparedness standards of NUREG-0654/FEMA-REP-1, Revision 1, November 1980, as referenced in 44 CFR 350.5) and there is reasonable assurance they can be implemented, as demonstrated during this Drill.

An Improvement Plan (IP) will not be developed as part of this report.

## APPENDIX A: EVALUATORS AND TEAM LEADERS

The following is the list of Evaluators and Team Leaders for the TMI 2018 MS-1 Drill evaluated on March 28, 2018. The following constitutes the managing staff for the Evaluation:

- Thomas Scardino, DHS/FEMA, Regional Assistance Committee Chairman
- Joseph Suders, DHS/FEMA, Technological Hazards Program Specialist, Lead Evaluator

DATE: March 28, 2018

SITE: TMI

LOCATION	EVALUATOR	AGENCY
Wellspan Good Samaritan Hospital	Joseph Suders	FEMA RIII
First Aid and Safety Patrol EMS	Lee Torres	FEMA RIII



## APPENDIX B: ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
AAR	After Action Report
ALARA	As Low As Reasonably Achievable
ALC	Annual Letter of Certification
ANS	Alert and Notification System
BRP	Bureau of Radiation Protection
DHS	Department of Homeland Security
DRD	Direct Reading Dosimeter
EMS	Emergency Medical Services
EOP	Extent of Play
EPZ	Emergency Planning Zone
FASP	First Aid and Safety Patrol
FEMA	Federal Emergency Management Agency
FMT	Field Monitoring Team
GE	General Emergency
IP	Improvement Plan
KI	Potassium Iodide
LCEMA	Lebanon County Emergency Management Agency
MS-1	Medical Services
NPP	Nuclear Power Plant
NRC	Nuclear Regulatory Commission
ORO	Offsite Response Organization
PEMA	Pennsylvania Emergency Management Agency
PPE	Personal Protective Equipment
PRD	Permanent Record Dosimeter
RAC	Regional Assistance Committee
REA	Radiation Emergency Area
REP	Radiological Emergency Preparedness
RERP	Radiological Emergency Preparedness Program
SAE	Site Area Emergency
SOP	Standard Operating Procedure

## APPENDIX C: EXTENT-OF-PLAY AGREEMENT

The Extent-of-Play Agreement was extracted from the Exercise Plan, which was drafted by Pennsylvania Emergency Management Agency, and is included in this report as an Appendix. The Extent-of-Play was negotiated and agreed upon by FEMA Region III, and Pennsylvania Emergency Management Agency.

The Exercise Plan was created as an overall tool for facilitation and implementation of the TMI MS-1 Drill and to integrate the concepts and policies of the Homeland Security Exercise Evaluation Program with the Radiological Emergency Preparedness Program Exercise Methodology.

**THREE MILE ISLAND**  
**Wellspan Good Samaritan Hospital**  
**March 28, 2018**

**Method of Operation**

1. The power station and its personnel will not play as active role in the facilitation of this exercise. The plant's simulated events, radiation releases, and emergency classifications will be injected by off-site controllers. A pre-approved scenario will be used.
2. The Pennsylvania Emergency Management Agency (PEMA), PEMA Central Area Office and the Bureau of Radiation Protection (BRP) will not be activated as part of this exercise. The Exercise Coordinator will provide pre-exercise coordination and observe exercise activities.
3. Exelon will participate as a Controller in this exercise.
4. Lebanon County Emergency Management Agency will provide pre-exercise coordination, participate in this exercise as the county communications coordinator and observe exercise activities.
5. Controllers will be supplied by PEMA/Exelon. Controllers are not players and will provide injects and information to initiate and stimulate exercise play by providing radiological readings during the monitoring of personnel. Live radioactive sources will only be used to perform operational checks of radiological monitoring instruments.
6. PEMA staff and qualified county emergency management personnel will be assigned to key locations for the purpose of observing, noting response actions and conditions, and recording observations for future use. Observers will not take an active part in the proceedings, but will interact with staff members to the extent necessary to fulfill their observer responsibilities. Coaching of players is not permitted, except as appropriate to provide training to participants awaiting a re-demonstration.
7. Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA), Radiological Emergency Preparedness Program (REPP) Evaluators: FEMA Evaluators will be present at designated demonstration locations.
8. Exercise activities are scheduled to commence on or about 0900, March 28, 2018 and continue until the participants have completed the exercise objectives and demonstrated the Exercise Evaluation Criteria.
9. Participants and agencies will Stand Down when the Controllers have confirmed with the evaluators that all evaluation criteria have been demonstrated and when the State and County Observers are satisfied that the Objectives have been met.

10. An emergency plan is drafted to address the generally expected conditions of an emergency. Not everything in the emergency plan may be applicable for a given scenario. The main purpose of an emergency plan is to assemble sufficient expertise and officials so as to properly react to the events as they occur. The responders should not be so tied to a plan that they cannot take actions that are more protective of the public. Therefore, if, by not following the plan, the responders protect the public equally as well as provided in the plan, it should be noted for possible modification of the plan, but not classified as a negative incident. Furthermore, if, by following the plan there is a failure to protect the public health and safety, it should be noted so that the plan can be modified and the appropriate negative assessment corrected.
11. During the exercise any activity that is not satisfactorily demonstrated may be re-demonstrated by the participants during the exercise, provided it does not negatively interfere with the exercise. Refresher training may be provided by the players, observers, and/or controllers. Re-demonstrations will be negotiated between the players, observers, controllers, and evaluators. It is permissible to extend the demonstration window, within reason, to accommodate the re-demonstration. Activities corrected from a re-demonstration will be so noted.

### **Objectives**

- A. Demonstrate the ability to respond to a radiation medical emergency following the procedures of Lebanon County Emergency Management Agency, First Aid and Safety Patrol and Wellspan Good Samaritan Hospital.
- B. Demonstrate timely and accurate communications between the hospital and offsite response agencies. (Telephones will be used in lieu of radios whenever possible to limit the potential misinterpretation of the exercise as an actual event.)
- C. Demonstrate correct priorities and appropriate techniques in EMS, transportation of patients and pre-hospital and hospital emergency care of radioactively contaminated patients.
- D. Demonstrate inter-agency cooperation between the Ambulance Company/ EMS and the Hospital.

**THREE MILE ISLAND**  
**WELLSPAN GOOD SAMARITAN MEDICAL SERVICES EXERCISE**

**Extent of Play Agreement**

**Evaluation Area 1—Emergency Operations Management**

***Sub-element 1.e – Equipment and Supplies to Support Operations***

**INTENT**

This sub-element derives from NUREG-0654 / FEMA-REP-1, which requires that OROs have emergency equipment and supplies adequate to support the emergency response.

***Criterion 1.e.1: Equipment, maps, displays, monitoring instruments, dosimetry, potassium iodide (KI) and other supplies are sufficient to support emergency operations. (NUREG-0654 / FEMA-REP-1, H.7, 10; I.7, 8, 9; J.10.a, b, c; J.11, 12; K.3.a; K.5.b)***

**Assessment / Extent-of-Play**

Assessment of this Demonstration Criterion is accomplished primarily through a baseline evaluation and subsequent periodic inspections.

A particular facility's equipment and supplies must be sufficient and consistent with that facility's assigned role in the ORO's emergency operations plans. Use of maps and other displays is encouraged. For non-facility-based operations, the equipment and supplies must be sufficient and consistent with the assigned operational role. At locations where traffic and access control personnel are deployed, appropriate equipment (e.g., vehicles, barriers, traffic cones, and signs) must be available, or their availability described.

Specific equipment and supplies that must be demonstrated under this criterion include KI inventories, dosimetry, and monitoring equipment, as follows:

**KI:** Responsible OROs must demonstrate the capability to maintain inventories of KI sufficient for use by: (1) emergency workers; (2) institutionalized individuals, as indicated in capacity lists for facilities; and (3) where stipulated by the plans / procedures, members of the general public (including transients) within the plume pathway EPZ. In addition, OROs must demonstrate provisions to make KI available to specialized response teams (e.g., civil support team, Special Weapons and Tactics Teams, urban search and rescue, bomb squads, HAZMAT, or other ancillary groups) as identified in plans / procedures. The plans / procedures must include the forms to be used for documenting emergency worker ingestion of KI, as well as, a mechanism for identifying emergency workers that have declined KI in advance.

ORO quantities of dosimetry and KI available and storage locations(s) will be confirmed by physical inspection at the storage location(s) or through documentation of current inventory submitted during the exercise, provided in the ALC submission, and/or verified during an SAV. Available supplies of KI must be within the expiration date indicated on KI bottles or blister

packs. As an alternative, the ORO may produce a letter from a certified private or state laboratory indicating that the KI supply remains potent, in accordance with U.S. Pharmacopoeia standards.

**Dosimetry:** Sufficient quantities of appropriate direct-reading and permanent record dosimetry and dosimeter chargers must be available for issuance to all emergency workers who will be dispatched to perform an ORO mission. In addition, OROs must demonstrate provisions to make dosimetry available to specialized response teams (e.g., civil support team, Special Weapons and Tactics Teams, urban search and rescue, bomb squads, HAZMAT, or other ancillary groups) as identified in plans / procedures.

Appropriate direct-reading dosimetry must allow an individual(s) to read the administrative reporting limits and maximum exposure limits contained in the ORO's plans / procedures.

Direct-reading dosimeters must be zeroed or operationally checked prior to issuance. The dosimeters must be inspected for electrical leakage at least annually and replaced when necessary. Civil Defense Victoreen Model 138s (CDV-138s) (0-200 mR), due to their documented history of electrical leakage problems, must be inspected for electrical leakage at least quarterly and replaced when necessary. This leakage testing will be verified during the exercise, through documentation submitted in the (Annual Letter of Certification (ALC) and/or through a Staff Assistance Visit (SAV).

Operational checks and testing of electronic dosimeters must be in accordance with the manufacturer's instructions and be verified during the exercise, through documentation submitted in the ALC and/or through an SAV.

**Monitoring Instruments:** All instruments must be inspected, inventoried, and operationally checked before each use. Instruments must be calibrated in accordance with the manufacturer's recommendations. Unmodified CDV-700 series instruments and other instruments without a manufacturer's recommendation must be calibrated annually. Modified CDV-700 instruments must be calibrated in accordance with the recommendation of the modification manufacturer. A label indicating such calibration must be on each instrument or calibrated frequency can be verified by other means. In addition, instruments being used to measure activity must have a sticker-affixed to their sides indicating the effective range of the readings. The range of readings documentation specifies the acceptable range of readings that the meter should indicate when it is response-checked using a standard test source.

For Field Monitoring Teams (FMTs), the instruments must be capable of measuring gamma exposure rates and detecting beta radiation. These instruments must be capable of measuring a range of activity and exposure, including radiological protection / exposure control of team members and detection of activity on air sample collection media, consistent with the intended use of the instrument and the ORO's plans / procedures. An appropriate radioactive check source must be used to verify proper operational response for each low-range radiation measurement instrument (less than 1R/hr) and for high-range instruments when available. If a source is not available for a high-range instrument, a procedure must exist to operationally test the instrument before entering an area where only a high-range instrument can make useful readings.

In areas where portal monitors are used, the OROs must set up and operationally check the monitor(s). The monitor(s) must conform to the standards set forth in the *Contamination Monitoring Standard for a Portal Monitor Used for Emergency Response*, FEMA-REP-21 (March 1995) or in accordance with the manufacturer's recommendations.

**Mutual Aid Resources:** If the incoming resources arrive with their own equipment (i.e., monitors and / or dosimetry) they will be evaluated by REP Program standards. FEMA will not inventory equipment that is not part of the REP Program. If an agency has a defined role in the REP Plan, they are subject to the planning process and standards, as well as the guidance of this Manual.

All activities must be based on the ORO's plans / procedures and completed as they would be in an actual emergency, unless noted above or otherwise specified in the Extent-of-Play Agreement.

**State Negotiated Extent of Play:**

*In accordance with PEMA standard operating procedures ambulance crews operating outside the 10 mile Emergency Planning Zone are considered 'Category C' emergency workers; therefore, they are only required to implement protective measures consistent with protection against blood-borne pathogens; i.e., long sleeved garments, trousers, impermeable gloves, and surgical masks. Ambulance "Category C" emergency workers are not issued dosimetry or KI unless they are tasked to enter the 10 mile EPZ. At that time, the county will issue what is needed.*

*Hospital personnel are also considered "Category C" emergency workers and will conform to PEMA Standard Operating Procedure (SOP) protective measures at minimum. Direct Reading Dosimeters may be issued individually; however, an Area Kit will be established in the Radiation Emergency Area (REA). Individual PRDs will be issued by the hospital. Radiological Survey Instruments are calibrated per manufactures recommendations.*

### **Evaluation Area 3—Protective Action Implementation**

#### ***Sub-element 3.a – Implementation of Emergency Worker Exposure Control***

##### **INTENT**

This Sub-element is derived from NUREG-0654 / FEMA-REP-1, which requires that OROs have the capability to provide for the following: distribution, use, collection, and processing of direct-reading dosimetry and permanent record dosimetry; reading of direct-reading dosimetry by emergency workers at appropriate frequencies; maintaining a radiation dose record for each emergency worker; establishing a decision chain or authorization procedure for emergency workers to incur radiation exposures in excess of the PAGs; and the capability to provide KI for emergency workers, always applying the as low as is reasonably achievable (ALARA) principle as appropriate.

***Criterion 3.a.1: The OROs issue appropriate dosimetry, KI, and procedures, and manage radiological exposure to emergency workers in accordance with the plans / procedures. Emergency workers periodically and at the end of each mission read their dosimeters and record the readings on the appropriate exposure record or chart. OROs maintain appropriate record-keeping of the administration of KI to emergency workers. (NUREG-0654 / FEMA-REP-1, K.3.a, b; K.4)***

##### **Assessment / Extent-of-Play**

Assessment of this Demonstration Criterion may be accomplished during a biennial or tabletop exercise. Other means may include drills, seminars or training activities that would fully demonstrate technical proficiency.

ORO's must demonstrate the capability to provide emergency workers (including supplemental resources) with the appropriate direct-reading and permanent record dosimetry, dosimeter chargers, KI, and instructions on the use of these items. For evaluation purposes, appropriate direct-reading dosimetry is defined as dosimetry that allows an individual(s) to read the administrative reporting limits that are pre-established at a level low enough to consider subsequent calculation of TEDE and maximum exposure limits, for those emergency workers involved in lifesaving activities, contained in the ORO's plans / procedures.

Each emergency worker must have basic knowledge of radiation exposure limits as specified in the ORO's plans / procedures. If supplemental resources are used, they must be provided with just-in-time training to ensure basic knowledge of radiation exposure control. Emergency workers must demonstrate procedures to monitor and record dosimeter readings and manage radiological exposure control.

During a plume phase exercise, emergency workers must demonstrate the procedures to be followed when administrative exposure limits and turn-back values are reached. The emergency worker must report accumulated exposures during the exercise as indicated in the plans / procedures. OROs must demonstrate the actions described in the plans / procedures by determining whether to replace the worker, authorize the worker to incur additional exposures, or



take other actions. If exercise play does not require emergency workers to seek authorizations for additional exposure, evaluators must interview at least two workers to determine their knowledge of whom to contact in case authorization is needed, and at what exposure levels. Workers may use any available resources (e.g., written procedures and/or coworkers) in providing responses.

Although it is desirable for all emergency workers to each have a direct-reading dosimeter, there may be situations where team members will be in close proximity to each other during the entire mission. In such cases, adequate control of exposure can be achieved for all team members using one direct-reading dosimeter (DRD) worn by the team leader. Emergency workers assigned to low-exposure rate fixed facilities (e.g., EOCs and communications center within the EPZ, reception centers, and counting laboratories) may have individual direct-reading dosimeters or they may be monitored using group dosimetry (i.e., direct-reading dosimeters strategically placed in the work area). Each team member must still have his or her own permanent record dosimetry. Individuals authorized by the ORO to reenter an evacuated area during the plume (emergency) phase, must be limited to the lowest radiological exposure commensurate with completing their missions.

OROs may have administrative limits lower than EPA-400-R-92-001 dose limits for emergency workers performing various services (e.g., life-saving, protection of valuable property, all activities). OROs must ensure that the process used to seek authorization for exceeding dose limits does not negatively impact the capability to respond to an incident where life-saving and/or protection of valuable property may require an urgent response.

OROs must demonstrate the capability to accomplish distribution of KI to emergency workers consistent with decisions made. OROs must have the capability to develop and maintain lists of emergency workers who have ingested KI, including documentation of the date(s) and time(s) they did so. Ingestion of KI recommended by the designated ORO health official is voluntary. For evaluation purposes, the actual ingestion of KI shall not be performed. OROs must demonstrate the capability to formulate and disseminate instructions on using KI for those advised to take it. Emergency workers must demonstrate basic knowledge of procedures for using KI whether or not the scenario drives the implementation of KI use. This can be accomplished by an interview with the evaluator.

All activities must be based on the ORO's plans / procedures and completed as they would be in an actual emergency, unless noted above or otherwise specified in the Extent-of-Play Agreement.

**State Negotiated Extent of Play:**

*Radiological briefings will be provided to address exposure limits and procedures to replace personnel approaching limits and how permission to exceed limits is obtained. At any time, players may ask other players or supervisors to clarify radiological information. In Pennsylvania, emergency workers outside the EPZ do not have turn-back values. Standard issue of dosimetry and potassium iodide for each category of emergency worker is as follows:*

*Category A: 1 PRD, 1 DRD, and 1 unit of KI*

*Category B: 1 PRD and 1 unit of KI*

*Category C: 1 PRD*

*All locations that have dosimetry equipment indicated within their Radiological Emergency Response Plan (RERP) will make the dosimetry equipment (and KI, as appropriate) available for inspection by the Federal Evaluator. In order to demonstrate an understanding of the use of the dosimetry equipment, KI and associated forms; the location need only remove and distribute / issue a maximum of six (6) units of dosimetry from their inventory. Simulation Permanent Record Dosimeters (PRDs) with mock serial numbers may be used.*

*EMS units outside the EPZ fall under guidance from the Interim Annex E letter dated April 6, 2009. Under section V-Concept of Operations, subsection D-Survey equipment requirements, Paragraph 8 EMS crews outside the EPZ are exempted from needing PRD, DRD, or KI (Page I-7)*

## **Evaluation Area 6—Support Operation/ Facilities**

### ***Sub-element 6.d - Transportation and Treatment of Contaminated Injured Individuals***

#### **INTENT**

This Sub-element is derived from NUREG-0654 / FEMA-REP-1, which requires that OROs have the capability to transport contaminated injured individuals to medical facilities with the capability to provide medical services.

***Criterion 6.d.1: The facility / ORO has the appropriate space, adequate resources, and trained personnel to provide transport, monitoring, decontamination, and medical services to contaminated injured individuals. (NUREG-0654 / FEMA-REP-1, F.2; H.10; K.5.a, b; L.1, 4)***

#### **Assessment / Extent-of-Play**

Assessment of this Demonstration Criterion may be accomplished during a biennial exercise, an actual event, or drills. FEMA has determined that these capabilities have been enhanced and consistently demonstrated as adequate; therefore, offsite medical services drills need only be evaluated biennially. FEMA will, at the request of the involved ORO, continue to evaluate the drills on an annual basis. If more than two medical facilities and transportation providers are designated as primary or backup, they are also evaluated biennially.

Monitoring, decontamination, and contamination control efforts must not delay urgent medical care for the victim.

ORO must demonstrate the capability to transport contaminated injured individuals to medical facilities.

An ambulance must be used for response to the victim. However, to avoid taking an ambulance out of service for an extended time, OROs may use any vehicle (e.g., car, truck, or van) to transport the victim to the medical facility. It is allowable for an ambulance to demonstrate up to the point of departure for the medical facility and then have a non-specialized vehicle transport the "victim(s)" to the medical facility. This option is used in areas where removing an ambulance from service to drive a great distance (over an hour) for a drill would not be in the best interests of the community.

Normal communications between the ambulance/dispatcher and the receiving medical facility must be demonstrated. If a substitute vehicle is used for transport to the medical facility, this communication must occur before releasing the ambulance from the drill. This communication would include reporting radiation monitoring results, if available. In addition, the ambulance crew must demonstrate, by interview, knowledge of where the ambulance and crew would be monitored and decontaminated, if required, or whom to contact for such information.

Monitoring of the victim may be performed before transport or enroute, or may be deferred to the

medical facility. Contaminated injured individuals transported to medical facilities are monitored as soon as possible to assure that everyone (ambulance and medical facility) is aware of the medical and radiological status of the individual(s). However, if an ambulance defers monitoring to the medical facility, then the ambulance crew presumes that the patient(s) is contaminated and demonstrate appropriate contamination controls until the patient(s) is monitored. Before using monitoring instruments, the monitor(s) must demonstrate the process of checking the instrument(s) for proper operation. All monitoring activities must be completed as they would be in an actual emergency. Appropriate contamination control measures must be demonstrated before and during transport and at the receiving medical facility.

The medical facility must demonstrate the capability to activate and set up a radiological emergency area for treatment. Medical facilities are expected to have at least one trained physician and one trained nurse to perform and supervise treatment of contaminated injured individuals. Equipment and supplies must be available for treatment of contaminated injured individuals.

The medical facility must demonstrate the capability to make decisions on the need for decontamination of the individual, follow appropriate decontamination procedures, and maintain records of all survey measurements and samples taken. All procedures for collection and analysis of samples and decontamination of the individual must be demonstrated or described to the evaluator. Waste water from decontamination operations must be handled according to facility plans / procedures.

All activities must be based on the ORO's plans / procedures and completed as they would be in an actual emergency, unless noted above or otherwise specified in the Extent-of-Play Agreement.

**State Negotiated Extent of Play:**

*Demonstrate that the facility has the appropriate space, adequate resources and trained personnel to provide monitoring, decontamination and medical services to contaminated/injured individuals.*

*Demonstrate the ability to transport contaminated/injured individuals while using ALARA principles.*

*The Ambulance Service will pick-up a pre-staged simulated contaminated/injured victim.*